

St. Louis Army Ammunition Plant
St. Louis
St. Louis County
Missouri

HAER No. Mo-9

HAER
MO,
96-SALV,
79-

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Washington, DC 20013-7127

HISTORIC AMERICAN ENGINEERING RECORD

St. Louis Army Ammunition Plant

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Location: At the intersection of Goodfellow Boulevard and Interstate Highway 70 in St. Louis, Missouri.

Date of Construction: Established in 1941.

Owner: Department of the Army

Significance: This installation is a government-owned, contractor-operated facility established during World War II for the production of small arms ammunition and 105mm artillery projectiles. In laid-away condition since 1969, the installation still preserves its World War II technology for manufacturing 105mm projectiles.

Historical Report
Prepared by: Jeffrey A. Hess, 1984.

Prepared for
Transmittal by: Robie S. Lange, HABS/HAER, 1985.

EXECUTIVE SUMMARY

The St. Louis Army Ammunition Plant (SLAAP) is part of the Army's Armament, Munitions and Chemical Command (AMCCOM). The installation is a government-owned, contractor-operated, shell-production facility located at the intersection of Goodfellow Boulevard and Interstate Highway 70 in St. Louis, Missouri. Constructed during 1941-1944 for the manufacture of small arms ammunition and 105-mm artillery projectiles, the SLAAP originally consisted of approximately 300 buildings on 276 acres. In the mid-1960s, all but the projectile-manufacturing complex was sold as surplus property, reducing the installation to its present size of about 21 acres and a dozen buildings. After World War II, the plant was maintained as a standby facility, and with only minor modification, it was reactivated for production runs during the Korean and Vietnam Wars. In laid-away condition since 1969, the installation still preserves its World-War-II technology for manufacturing 105-mm projectiles. There are no Category I or II historic properties at the St. Louis Army Ammunition Plant. Because the Billet-Cutting Building (Building 1), the Forge Shop (Building 2), and the Machining Building (Building 3) are good, highly intact examples of the 105-mm, shell-production process, they are Category III historic properties.

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PREFACE

This report presents the results of an historic properties survey of the St. Louis Army Ammunition Plant (SLAAP). Prepared for the United States Army Materiel Development and Readiness Command (DARCOM), the report is intended to assist the Army in bringing this installation into compliance with the National Historic Preservation Act of 1966 and its amendments, and related federal laws and regulations. To this end, the report focuses on the identification, evaluation, documentation, nomination, and preservation of historic properties at the SLAAP. Chapter 1 sets forth the survey's scope and methodology; Chapter 2 presents an architectural, historical, and technological overview of the installation and its properties; and Chapter 3 identifies significant properties by Army category and sets forth preservation recommendations. Illustrations and an annotated bibliography supplement the text.

This report is part of a program initiated through a memorandum of agreement between the National Park Service, Department of the Interior, and the U.S. Department of the Army. The program covers 74 DARCOM installations and has two components: 1) a survey of historic properties (districts, buildings, structures, and objects), and 2) the development of archaeological overviews. Stanley H. Fried, Chief, Real Estate Branch of Headquarters DARCOM, directed the program for the Army, and Dr. Robert J. Kapsch, Chief of the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) directed the program for the National Park Service. Sally Kress Tompkins was program manager, and Robie S. Lange was

project manager for the historic properties survey. Technical assistance was provided by Donald C. Jackson.

Building Technology Incorporated acted as primary contractor to HABS/HAER for the historic properties survey. William A. Brenner was BTI's principal-in-charge and Dr. Larry D. Lankton was the chief technical consultant. Major subcontractors were the MacDonald and Mack Partnership and Jeffrey A. Hess. The author of this report was Jeffrey A. Hess. The author gratefully acknowledges the help of Meryl Humphreys, Commander's Representative, and Wallace Kidd, Chief of Security at the SLAAP.

The complete HABS/HAER documentation for this installation will be included in the HABS/HAER collections at the Library of Congress, Prints and Photographs Division, under the designation HAER No. MO-9.

Chapter 1

INTRODUCTION

SCOPE

This report is based on an historic properties survey conducted in June 1983 of all Army-owned properties located within the official boundaries of the St. Louis Army Ammunition Plant (SLAAP). The survey included the following tasks:

- . Completion of documentary research on the history of the installation and its properties.
- . Completion of a field inventory of all properties at the installation.
- . Preparation of a combined architectural, historical, and technological overview for the installation.
- . Evaluation of historic properties and development of recommendations for preservation of these properties.

Also completed as a part of the historic properties survey of the installation, but not included in this report, are HABS/HAER Inventory cards for 9 individual properties. These cards, which constitute HABS/HAER Documentation Level IV, will be provided to the Department of the Army. Archival copies of the cards, with their accompanying photographic

negatives, will be transmitted to the HABS/HAER collections at the Library of Congress.

The methodology used to complete these tasks is described in the following section of this report.

METHODOLOGY

1. Documentary Research

The SLAAP was one of six government-owned, contractor-operated facilities constructed during 1940-1942 for the manufacture of military small arms ammunition.* It was also one of two ammunition plants partially converted to the manufacture of artillery projectiles. Since the plant was part of a larger manufacturing network, an evaluation of its historical and technological significance requires a general understanding of the wartime munitions industry. To identify published documentary sources on American ammunition and artillery-projectile manufacturing during World War II, research was conducted in standard bibliographies of military history, engineering, and the applied sciences. Unpublished sources were identified by researching the historical and technical archives of the U.S. Army Armament, Munitions and Chemical Command (AMCCOM) at Rock

* By traditional usage, small arms ammunition includes all projectiles with a diameter measuring six-tenths of an inch (.60 caliber) or less.

Island Arsenal.¹ In addition to such industry-wide research, a concerted effort was made to locate published sources dealing specifically with the history and technology of the SLAAP. This site-specific research was conducted primarily at the AMMCOM Historical Office at Rock Island Arsenal, the Missouri Historical Society in St. Louis, the St. Louis Public Library, and the SLAAP (administrative archives, real property records, facilities engineering records). Since this search yielded little information on the operation of the SLAAP prior to the 1970s, additional enquiries were made at the Federal Archives and Records Center in Kansas City, Kansas, which is a major depository for St. Louis-area federal records. No information on the SLAAP, however, was available at the Kansas City records center.² The Missouri State Historic Preservation Office (Missouri Department of Natural Resources in Jefferson City) was also contacted concerning the architecture, history, and technology of the SLAAP, but had no pertinent data on the installation.

Army records used for the field inventory included current Real Property Inventory (RPI) printouts that listed all officially recorded buildings and structures by facility classification and date of construction; the installation's property record cards; base maps and photographs supplied by installation personnel; and installation master planning, archaeological, environmental assessment, and related reports and documents. A complete listing of this documentary material may be found in the bibliography.

2. Field Inventory

Architectural and technological field surveys were conducted in June 1983 by Jeffrey A. Hess. Following a general discussion with Meryl Humphreys, Commander's Representative at the installation, the surveyor was permitted access to all exterior areas without escort. Interior surveys of the major manufacturing buildings were conducted, with Mr. Humphreys serving as guide in the Billet-Cutting Building (1) and the Forge Shop (2), and Wallace Kidd of the contractor's staff in the Machining Building (3).

Field inventory procedures were based on the HABS/HAER Guidelines for Inventories of Historic Buildings and Engineering and Industrial Structures.³ All areas and properties were visually surveyed. Building locations and approximate dates of construction were noted from the installation's property records and field-verified. Interior surveys were made of the major facilities to permit adequate evaluation of architectural features, building technology, and production equipment.

Field inventory forms were prepared for, and black and white 35 mm photographs taken of all buildings and structures through 1945 except basic utilitarian structures of no architectural, historical, or technological interest. When groups of similar ("prototypical") buildings were found, one field form was normally prepared to represent all buildings of that type. Field inventory forms were also completed for representative post-1945 buildings and structures.⁴

Information collected on the field forms was later evaluated, condensed, and transferred to HABS/HAER Inventory cards.

3. Historical Overview

A combined architectural, historical, and technological overview was prepared from information developed from the documentary research and the field inventory. It was written in two parts: 1) an introductory description of the installation, and 2) a history of the installation by periods of development, beginning with pre-military land uses. Maps and photographs were selected to supplement the text as appropriate.

The objectives of the overview were to 1) establish the periods of major construction at the installation, 2) identify important events and individuals associated with specific historic properties, 3) describe patterns and locations of historic property types, and 4) analyze specific building and industrial technologies employed at the installation.

4. Property Evaluation and Preservation Measures

Based on information developed in the historical overviews, properties were first evaluated for historical significance in accordance with the eligibility criteria for nomination to the National Register of Historic Places. These criteria require that eligible properties possess integrity of location, design, setting, materials,

workmanship, feeling, and association, and that they meet one or more of the following:⁵

- A. Are associated with events that have made a significant contribution to the broad patterns of our history.
- B. Are associated with the lives of persons significant in the nation's past.
- C. Embody the distinctive characteristics of a type, period, or method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction.
- D. Have yielded, or may be likely to yield, information important in pre-history or history.

Properties thus evaluated were further assessed for placement in one of five Army historic property categories as described in Army Regulation 420-40:⁶

- Category I Properties of major importance
- Category II Properties of importance
- Category III Properties of minor importance
- Category IV Properties of little or no importance

Category V Properties detrimental to the significance
of adjacent historic properties.

Based on an extensive review of the architectural, historical, and technological resources identified on DARCOM installations nationwide, four criteria were developed to help determine the appropriate categorization level for each Army property. These criteria were used to assess the importance not only of properties of traditional historical interest, but also of the vast number of standardized or prototypical buildings, structures and production processes that were built and put into service during World War II, as well as of properties associated with many post-war technological achievements. The four criteria were often used in combination and are as follows:

- 1) Degree of importance as a work of architectural, engineering, or industrial design. This criterion took into account the qualitative factors by which design is normally judged: artistic merit, workmanship, appropriate use of materials, and functionality.
- 2) Degree of rarity as a remaining example of a once widely used architectural, engineering, or industrial design or process. This criterion was applied primarily to the many standardized or prototypical DARCOM buildings, structures, or industrial processes. The more widespread or influential the design or process, the greater the importance of the remaining examples of the design or process was considered to be. This

criterion was also used for non-military structures such as farmhouses and other once prevalent building types.

- 3) Degree of integrity or completeness. This criterion compared the current condition, appearance, and function of a building, structure, architectural assemblage, or industrial process to its original or most historically important condition, appearance, and function. Those properties that were highly intact were generally considered of greater importance than those that were not.
- 4) Degree of association with an important person, program, or event. This criterion was used to examine the relationship of a property to a famous personage, wartime project, or similar factor that lent the property special importance.

The majority of DARCOM properties were built just prior to or during World War II, and special attention was given to their evaluation. Those that still remain do not often possess individual importance, but collectively they represent the remnants of a vast construction undertaking whose architectural, historical, and technological importance needed to be assessed before their numbers diminished further. This assessment centered on an extensive review of the military construction of the 1940-1945 period, and its contribution to the history of World War II and the post-war Army landscape.

Because technology has advanced so rapidly since the war, post-World War II properties were also given attention. These properties were evaluated in terms of the nation's more recent accomplishments in weaponry, rocketry, electronics, and related technological and scientific endeavors. Thus the traditional definition of "historic" as a property 50 or more years old was not germane in the assessment of either World War II or post-war DARCOM buildings and structures; rather, the historic importance of all properties was evaluated as completely as possible regardless of age.

Property designations by category are expected to be useful for approximately ten years, after which all categorizations should be reviewed and updated.

Following this categorization procedure, Category I, II, and III historic properties were analyzed in terms of:

- . Current structural condition and state of repair. This information was taken from the field inventory forms and photographs, and was often supplemented by rechecking with facilities engineering personnel.
- . The nature of possible future adverse impacts to the property. This information was gathered from the installation's master planning documents and rechecked with facilities engineering personnel.

Based on the above considerations, the general preservation recommendations presented in Chapter 3 for Category I, II, and III historic properties were developed. Special preservation recommendations were created for individual properties as circumstances required.

5. Report Review

Prior to being completed in final form, this report was subjected to an in-house review by Building Technology Incorporated. It was then sent in draft to the subject installation for comment and clearance and, with its associated historical materials, to HABS/HAER staff for technical review. When the installation cleared the report, additional draft copies were sent to DARCOM, the appropriate State Historic Preservation Officer, and, when requested, to the archaeological contractor performing parallel work at the installation. The report was revised based on all comments collected, then published in final form.

NOTES

1. The following bibliographies of published sources were consulted: Industrial Arts Index, 1938-1957; Applied Science and Technology Index, 1958-1980; Engineering Index, 1938-1983; Robin Higham, ed., A Guide to the Sources of United States Military History (Hamden, Conn.: Archon Books, 1975); John E. Jessup and Robert W. Coakley, A Guide to the Study and Use of Military History (Washington, D.C.: U.S. Government Printing Office, 1979); "Military Installations," Public Works History in the United States, eds., Suellen M. Hoy and Michael C. Robinson (Nashville: American Association for State and Local History, 1982), pp. 380-400. AMCCOM (formerly ARRCOM, or U.S. Army Armament Materiel Readiness Command) is the military agency responsible for supervising the operation of government-owned

munitions plants; its headquarters are located at Rock Island Arsenal, Rock Island, Illinois. Although there is no comprehensive index to AMCCOM archival holdings, the agency's microfiche collection of unpublished reports is itemized in ARRCOM, Catalog of Common Sources, Fiscal Year 1983, 2 vols. (no pl.: Historical Office, AMCCOM, Rock Island Arsenal, n.d.).

2. Author's interview with Alan Perry, Archivist, Federal Archives and Records Center, Kansas City, Kansas, June 29, 1983.
3. Historic American Buildings Survey/Historic American Engineering Record, National Park Service, Guidelines for Inventories of Historic Buildings and Engineering and Industrial Structures (unpublished draft, 1982).
4. Representative post-World War II buildings and structures were defined as properties that were: (a) "representative" by virtue of construction type, architectural type, function, or a combination of these, (b) of obvious Category I, II, or III historic importance, or (c) prominent on the installation by virtue of size, location, or other distinctive feature.
5. National Park Service, How to Complete National Register Forms (Washington, D.C.: U.S. Government Printing Office, January 1977).
6. Army Regulation 420-40, Historic Preservation (Headquarters, U.S. Army: Washington, D.C., 15 April 1984).

Chapter 2

HISTORICAL OVERVIEW

BACKGROUND

The SLAAP is a government-owned, contractor-operated installation located in the northwestern sector of St. Louis, Missouri at the intersection of Goodfellow Boulevard and Interstate Highway 70. Constructed during 1941-1944 as a manufacturing facility for small arms ammunition and 105-mm artillery projectiles, the facility originally consisted of approximately 300 buildings on 276 acres. In the mid-1960s, all but the projectile-manufacturing complex was sold as surplus property, reducing the installation to about 21 acres and a dozen buildings (Figures 1, 2). With the exception of a small fire station built during the 1950s, the surviving buildings date from the World-War-II period.

Although the SLAAP occupied the smallest site of all the small arms ammunition plants built during World War II, it had the greatest combined production capacity for .30- and .50-caliber ammunition. The small arms ammunition lines remained in production until the summer of 1945, when they were deactivated and eventually dismantled. The artillery-projectile lines ceased production immediately following V-J Day, and were laid away for future emergencies. With only minor rehabilitation of its projectile lines, the SLAAP was reactivated for production runs during both the Korean and Vietnam Wars. A "standby" facility since late 1969, the SLAAP still retains its World-War-II-vintage technology for manufacturing 105-mm projectiles.

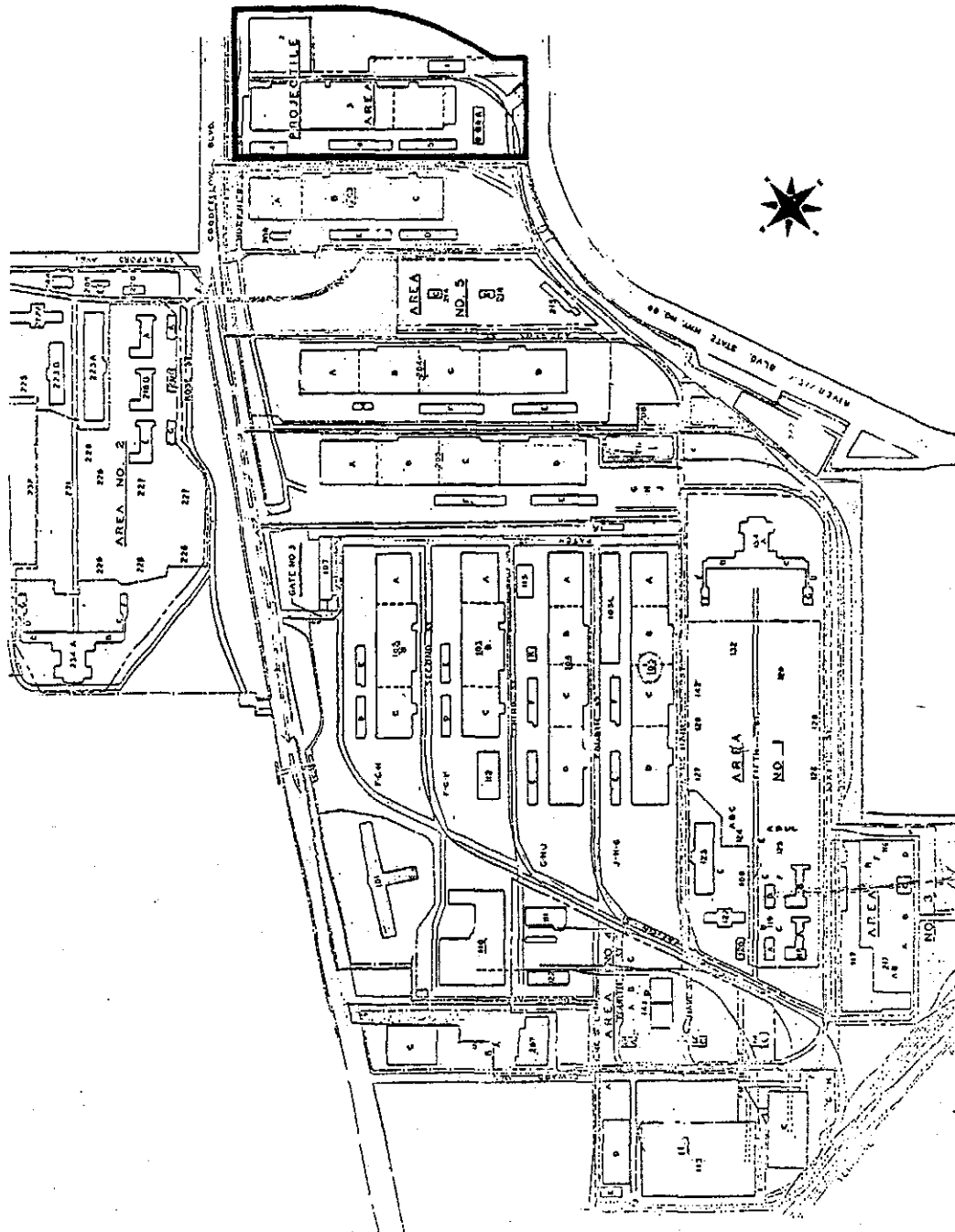


Figure 1: This site plan shows the original boundaries and major buildings of the St. Louis Army Ammunition Plant. The plant's present boundaries are outlined in the northwest corner of the plan. (Source: Facilities Engineer's Office, St. Louis Army Ammunition Plant.)

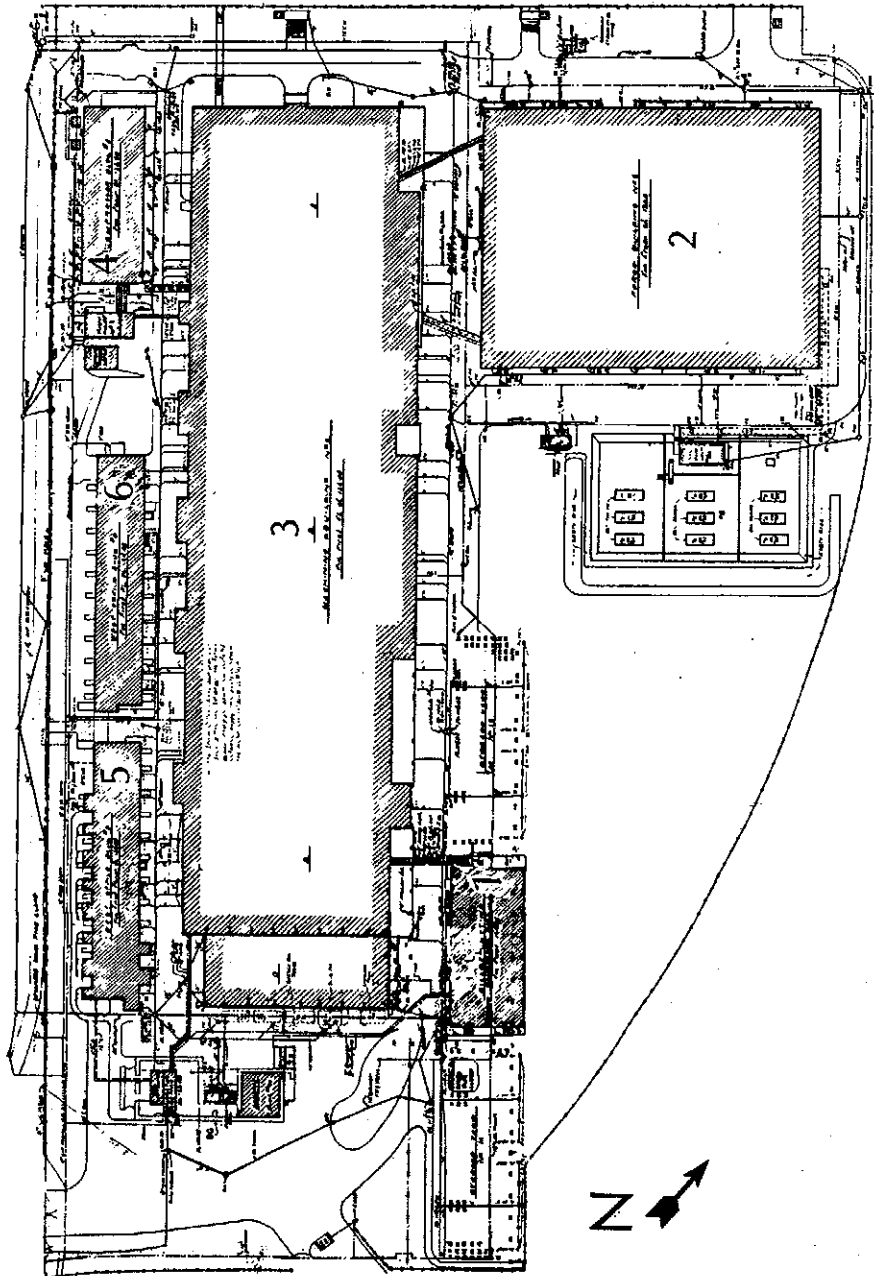


Figure 2: Building Identification Plan of the St. Louis Army Ammunition Plant.
(Source: Drawing No. 1-THRUHM-301, Facilities Engineer's Office,
St. Louis Army Ammunition Plant.)

For a more detailed understanding of the SLAAP's architectural and technological history, it is necessary to look more closely at the installation's three major production periods: World War II, the Korean War, and the Vietnam War. Whenever the available data permits, the discussion will focus on specific buildings and processes.

WORLD WAR II

When war broke out in Europe in the fall of 1939, the United States had virtually no industrial capability for manufacturing military small arms ammunition. During the 1930s, the only American plant producing such items was the government-owned-and-operated Frankford Arsenal in Philadelphia. Frankford's manufacturing capacity, however, was limited, and its production lines were antiquated. In 1938-1939, the government took the first steps toward remedying these deficiencies by allocating funds for the modernization of the arsenal's production machinery. At the same time, the arsenal's personnel were instructed to draw up "plans for speeding production in the event of war, including model plant layouts, descriptions of manufacture, estimates of personnel needs, lists of tools and machinery requirements, and data on commercial sources of raw materials."¹ These production plans laid the groundwork for the construction of six government-owned, contractor-operated, small arms ammunition plants that were built in two "waves" of three plants each during 1940-1942. The SLAAP was included in the first wave of construction.²

Site Selection and Former Land Use

A densely populated area like St. Louis was an unusual location for a small arms ammunition plant. As the Engineering News-Record noted in 1942, "most small arms ammunition plants being built for the U. S. Ordnance Department are in wide open country, spread over an area of 15,000 to 25,000 acres, but one of the largest of them all is jammed into a comparatively small plot almost entirely within the corporate limits of a mid-western city."³ Originally the Ordnance Department had intended to locate the plant in East Alton, Illinois, the home of Western Cartridge Company, one of the nation's few manufacturers of small arms ammunition. The government's official history of the small arms ammunition program explains how the revision of this plan led to the selection of the St. Louis site:

[The] plant was planned for operation by the Western Cartridge Company which had developed plans already for the expansion of its East Alton Plant. . . . It was evident almost immediately, however, that the planned capacity was too low, and a revised plan was submitted for approval on 11 September 1940. This plan provided for making the metal components in a new plant at St. Louis to be located on a 137 acre site owned by the General Electric Company. The loading, primer, and powder plants were to be at East Alton. . . . When a further study revealed a probable labor shortage at East Alton, the plans were revised again and provided for the location of the entire plant at St. Louis. This was a practical solution because the General Electric site had the requisite water facilities, railroad facilities, electric facilities, labor availability and a supplementary site for storage of powder and for a tracer firing range was available nearby. The revision was submitted for approval on 9 October 1940 in the amount of \$29,000,000. The President approved this expenditure on 21 October 1940.⁴

The General Electric site was a tract of rolling land located in northwestern St. Louis in an industrial area bordering a residential neighborhood. Apparently the property did not include any prominent

structures. But when the government doubled the SLAAP's area in June 1941 to increase manufacturing capacity, the expansion claimed at least twenty-five residences, which were subsequently removed.⁵ At present, the SLAAP does not contain any buildings that antedate the 1940s construction program.

Construction

Construction work at the SLAAP* commenced on January 1, 1941 under the general supervision of the Quartermaster Corps. The plant's overall design was the responsibility of Mauran, Russell, & Crowell, a St. Louis architectural firm that had designed a number of the city's major commercial buildings. The primary building contractors were Fruin-Colnon Contracting Co. and Massman Construction Co., both of St. Louis.⁶

When the main construction program was completed in the winter of 1942, the SLAAP contained about 300 buildings, including three buildings for manufacturing steel, armor-piercing, bullet-cores, and eight principal shops for manufacturing .30- and .50-caliber ammunition. As at the other first-wave plants, the major manufacturing buildings were flat-roofed, two-story, brick structures with little pretense to ornamentation (Figure 3). The SLAAP's ammunition-production facilities, however, did differ from their first-wave counterparts in one important respect. At the other

* When first constructed the SLAAP was officially known as the St. Louis Ordnance Plant. The installation's current name, which dates from 1966, is used throughout this report for the sake of brevity and clarity.

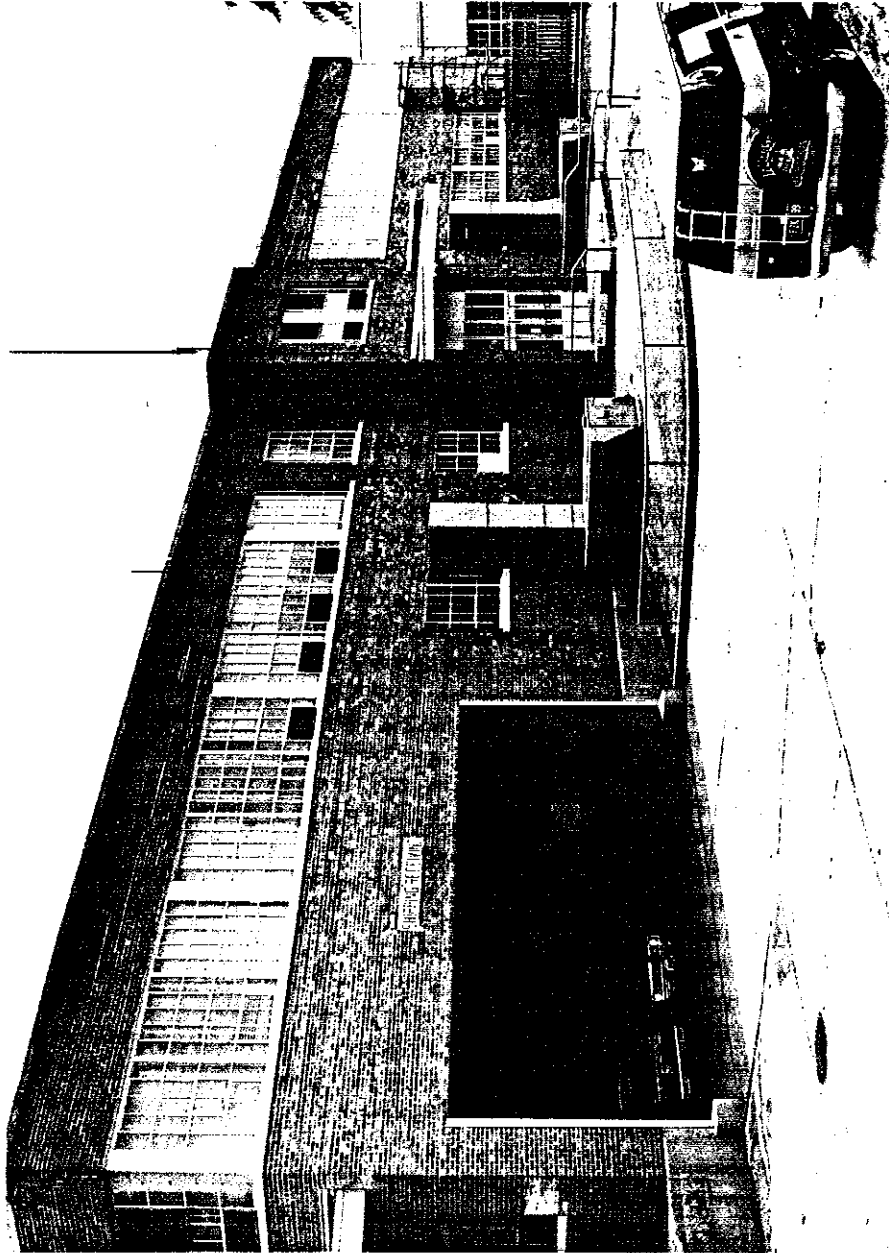


Figure 3: Building 3 is typical of the eight small arms ammunition shops constructed at the St. Louis Army Ammunition Plant during 1941-1943. The structure was converted into a Machining Building for 105-mm projectiles in 1944. (Source: Field inventory photograph, 1983, Jeffrey A. Hess, MacDonald and Mack Partnership.)

plants, cartridge-loading facilities were directly incorporated into the main ammunition shops by means of perpendicular wings. But at the SLAAP, the loading facilities flanked the main shops in separate structures. Although this arrangement increased material handling during the manufacturing process, it made better use of the SLAAP's limited construction area.⁷

In the summer of 1944, the SLAAP was one of two small arms ammunition plants partially converted to the manufacture of artillery projectiles. At the SLAAP, the new projectile area was located in the northern corner of the plant. A .30-Caliber Ammunition Shop (Building 3) was stripped of its production lines and re-outfitted with machining and heat-treating equipment for 105-mm shell bodies. To round out the projectile operation, three new buildings were constructed: a Billet-Cutting Building (Building 1), a Forge Shop (Building 2), and an Air-Compressor Building (Building 4).⁸ Designed in a utilitarian-industrial style, these buildings employed structural steel framing and Transite cladding (Figures 4, 5). During the remainder of the war, no further new construction occurred at that portion of the plant contained within the SLAAP's present boundaries.

Technology

As the world's largest small arms ammunition plant, the SLAAP was best known during World War II for its production of .30- and .50-caliber cartridges, which was supervised on a contract basis by United States



Figure 4: Billet-Cutting Building (Building 1), constructed in 1944. (Source: Field Inventory photograph, 1983, Jeffrey A. Hess, MacDonald and Mack Partnership.)

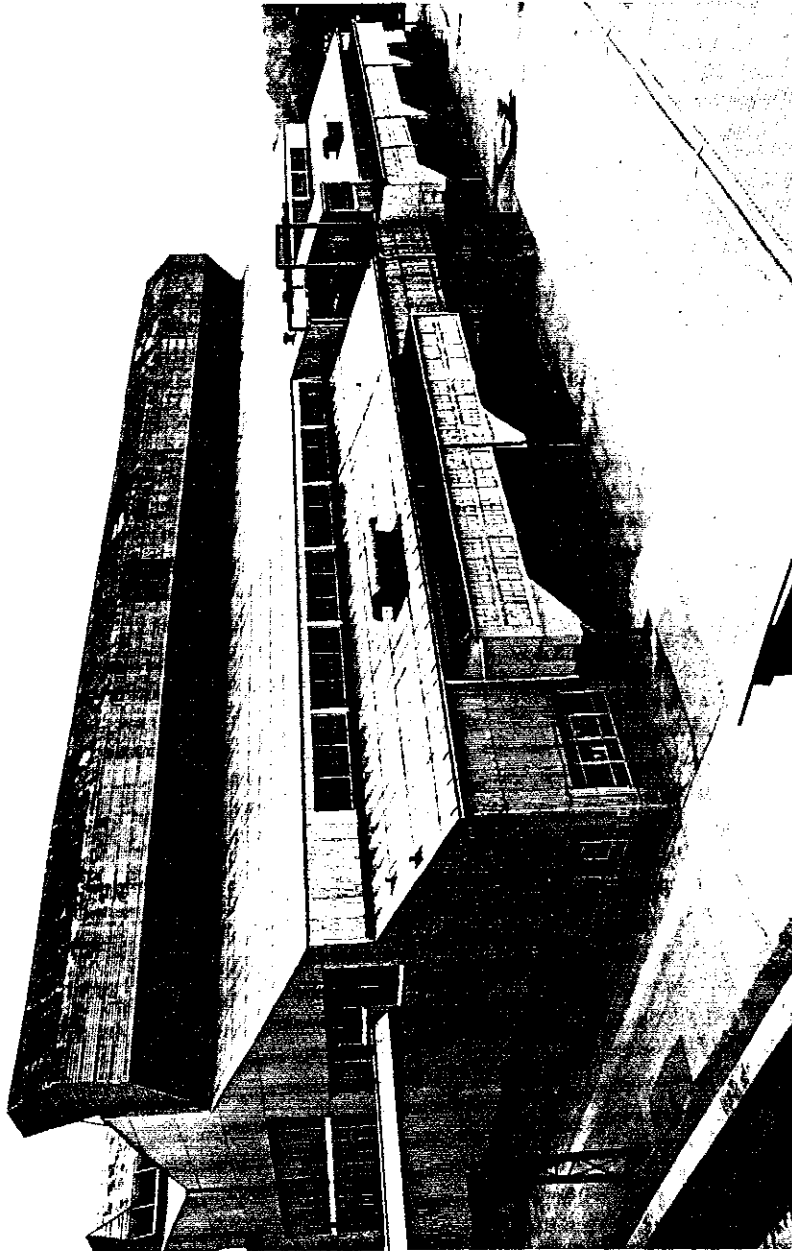


Figure 5: Forge Shop (Building 2), constructed in 1944. (Source: Field inventory photograph, 1983, Jeffrey A. Hess, MacDonald and Mack Partnership.)

Cartridge Co., a wholly-owned subsidiary of Western Cartridge Company of East Alton, Illinois. The SLAAP, however, also maintained two other major manufacturing operations: steel, armor-piercing, bullet-core production supervised by McQuay-Norris Manufacturing Co. of St. Louis, and 105-mm projectile production supervised by the Chevrolet Division of General Motors.⁹ Since the SLAAP's present boundaries contain only the projectile area, the following discussion will focus on the technology of that particular operation.

Basic production methods for 105-mm projectiles had been developed during World War I, refined at Frankford Arsenal in the post-war period, and then implemented on a large scale with the construction of Gadsden Ordnance Plant in Alabama in 1940-1941. The SLAAP's production techniques resembled the Gadsden operation.¹⁰ The manufacturing process began in the Billet-Cutting Building (Building 1), where steel billets were nicked by acetylene torches, and broken into "slugs" of proper length by vertical breaking presses. After inspection, the slugs were trucked to the Forge Shop (Building 2) for initial shaping. In the Forge Shop, the slugs were heated in furnaces, de-scaled by water blast, and then subjected to two piercing operations on vertical presses, which formed the interior cavity of the projectiles. After piercing, the forgings were elongated in horizontal draw presses, inspected, and loaded onto an electric-powered conveyor for delivery to the second floor of the adjacent Machining Building (Building 3).

In the Machining Building (Building 3), the forgings were subjected to a series of turning, pressing, heat-treating, and cleaning operations

designed to produce the projectiles' proper shape, dimensions, and hardness. Following these "rough-turn," "nosing," and "finish-turn" procedures, a knurled groove was cut into the lower end of each projectile body and a gilding-metal band pressed into place. During the pressing process, the knurlings in the groove imprinted the band with ridges which were designed to engage the gun rifling when the projectile was fired. After the banding operation, the projectile bodies were inspected, washed, painted, and loaded onto pallets for shipment. In the Machining Building (Building 3), the projectile bodies were circulated from one work station to another by means of an electric-powered conveyor. Nosing and rough-turn operations occurred on the second floor; finish-turn and banding operations on the first floor.

The SLAAP's projectile lines commenced production in December, 1944, and remained in operation until V-J Day. During this period, two-and-one-half million 105-mm shell bodies were manufactured. At the end of World War II, almost all of the production equipment was laid away in place, and the plant's projectile area was designated a "standby" facility.¹¹

KOREAN WAR

In May 1951, the SLAAP's projectile area was reactivated for production for the Korean War. The facility remained in operation until May 1954, when it reverted to standby status.

Construction

There was no major new construction at the SLAAP during the 1950s.

Technology

With only minimal rehabilitation, the SLAAP's projectile area was reactivated for Korean War production in May 1951. The World-War-II contractor, General Motors, once again supervised operations. This continuity in management enabled the plant "to meet and surpass even the most suddenly shortened leadtimes, exacerbated by antiquated, out-of-tolerance production equipment, an extremely high labor turn-over rate, and shortage of skilled production workers."¹² Despite equipment and labor problems, the SLAAP manufactured over 19,000,000 105-mm projectiles, which accounted for approximately 40% of the country's total production during that conflict. After the plant ceased production in May 1954, it was laid away as a standby facility with General Motors serving as maintenance contractor. In 1958, a new maintenance contract was negotiated with the United States Defense Corporation, a subsidiary of Olin Mathieson.¹³

VIETNAM WAR

In September 1966, the projectile area of the SLAAP was reactivated for production for the Vietnam War. The plant remained in operation until December 1969, when it reverted to standby status.

Construction

There was no major new construction at the SLAAP during the 1960s and 1970s.

Technology

The SLAAP did not experience any major technological changes during the Vietnam War. With General Motors once again serving as contract-operator, the plant was reactivated for production in September 1966, and during the next three years it manufactured approximately 24,000,000 105-mm projectiles. The projectile lines were shut down and laid away in December 1969, largely because "the badly worn machinery needed extensive, expensive repair, renovation, and multi-million dollar modernization."¹⁴ Since modernization did not occur during the plant's subsequent years as a standby facility, the SLAAP still retains its World-War-II-vintage technology for manufacturing 105-mm projectiles. The plant's maintenance is currently the responsibility of Donovan Construction Company of Minneapolis, and its sub-contractor, Plant Facilities & Engineering, Inc. of St. Louis.

NOTES

1. Harry C. Thomson and Lida Mayo, The Ordnance Department: Procurement and Supply (Washington, D.C.: Office of the Chief of Military History, Department of the Army, 1960), pp. 191-192; see also Small Arms Ammunition, A History of an Industry, vol. 1 (No. pl.: Ammunition Branch, Small Arms Division, Office of Chief of Ordnance, c. 1945), pp. 69-71.
2. Thompson and Mayo, pp. 194-196. The importance of the initial production planning at Frankford Arsenal is underscored in Charles O. Herb, "Small Arms Ammunition," Machinery, 49 (April 1943), 136. The

first-wave plants were authorized in the fall of 1940, and in addition to the St. Louis location, they were constructed at Denver, Colorado and Lake City (near Independence), Missouri. The second-wave plants were authorized in the spring of 1941 and were built at Des Moines, Iowa; Salt Lake City, Utah; and New Brighton (near St. Paul), Minnesota. The Ordnance Department eventually established twelve plants for the manufacture of small arms ammunition. Most of the later plants, however, were set up in existing factory facilities with only limited new construction; see Thomson and Mayo, pp. 200-303; Small Arms Ammunition, vol. 1, pp. 167-177.

3. "Big Arms Plant Built in Congested Area," Engineering News-Record, 128 (May 21, 1942), 62. The storage area and firing range was located about twenty miles away on a four-square-mile site in Valley Park, Missouri; see William Voight, Jr., "The Ordnance Organization in World War II," p. 280, unpublished report, c. 1945, microfiche in AMCCOM Historical Office, Rock Island Arsenal, Rock Island, Ill.
4. Small Arms Ammunition, vol. 1, pp. 147-148.
5. "Big Arms Plant Built in Congested Area," 62.
6. Small Arms Ammunition, vol. 1, p. 150. In December 1941, responsibility for munitions-plant construction was transferred from the Quartermaster Corps to the Army Corps of Engineers, which then finished the SLAAP project; see Lenore Fine and Jesse A. Remington, The Corps of Engineers: Construction in the United States (Washington, D.C.: Office of the Chief of Military History, United States Army, 1972), pp.467-476. The SLAAP's architect and builders are listed under "St. Louis Ordnance Plant," in a "Local History Card-File Index" at the St. Louis Public Library. The fact that Fruin-Colnon Contracting Co. and Massman Construction Co. were the SLAAP's builders is verified in Fine and Remington, pp. 311-312. The listing of Mauran, Russell & Crowell as architect has not been verified by any other source. The other first- and second-wave plants were designed by Smith, Hinchman, & Grylls, Inc. of Detroit, but that firm has no record of having worked on the SLAAP project (author's interview with Jim Braathen, Building Manager, Smith, Hinchman, & Grylls, Inc., August 24, 1983; John J. Woolfenden, "Small Arms Munitions," Heating & Ventilation, 40 [June, 1943], 38-51). Mauran, Russell & Crowell is no longer in existence; its work in St. Louis is briefly assessed in "Mauran, Russell & Crowell Give," Architectural Record (September 1931), 78.
7. The SLAAP's original construction program is briefly described in Voight, pp. 282-282. On the design of the other first- and second-wave plants, see Smith, Hinchman & Grylls, Inc., "Small Arms Ammunition Plants," Architectural Forum, 77 (September 1942), 61-92.
8. The Twin Cities Army Ammunition Plant was also partially converted to artillery-projectile manufacturing; see Thomson and Mayo, p. 218. The conversion of Building 3 (originally designated Building 202), and the construction of the new artillery-projectile manufacturing buildings is noted in "History of Installation," section of an unpublished

- report, n.d, in SLAAP Administrative Archives; "DARCOM Installations and Activity Brochure for St. Louis Army Ammunition Plant," p. 1, unpublished report, c. 1982, AMCCOM Historical Office.
9. The SLAAP is characterized as the largest small arms ammunition plant in Thomson and Mayo, p. 204; the same source (pp. 204-206) provides a good discussion of the plant's ammunition-manufacturing technology. On the armor-piercing, steel, bullet-core operation, see Small Arms Ammunition, vol. 2, pp. 277-278. Chevrolet is identified as the contract-operator of the plant's 105-mm operation in R. J. Hammond, Profile on Munitions, 1950-1977 (no pl: no pub., n.d.) p. 31, on microfiche, AMCCOM Historical Office.
 10. On the Gadsden 105-mm operation, see Walter N. Howley, "Gadsden Feeds the 105's," American Machinist, 87 (March 4, 1943), 101-110; Thomas E. LLoyd, "Manufacturing 105 mm. High Explosive Shell," Iron Age, 152 (December 2, 1943), 60-63. The description of the SLAAP's production process is based on the author's tour of the projectile-manufacturing buildings, escorted by Meryl Humphrys and Wallace Kidd, June 1983.
 11. Hammond, p. 31; "DARCOM Brochure," p. 1.
 12. Hammond, p. 31.
 13. DARCOM Brochure, p. 1.
 14. Hammond, pp. 31-32.

Chapter 3

PRESERVATION RECOMMENDATIONS

BACKGROUND

Army Regulation 420-40 requires that an historic preservation plan be developed as an integral part of each installation's planning and long-range maintenance and development scheduling.¹ The purpose of such a program is to:

- . Preserve historic properties to reflect the Army's role in history and its continuing concern for the protection of the nation's heritage.
- . Implement historic preservation projects as an integral part of the installation's maintenance and construction programs.
- . Find adaptive uses for historic properties in order to maintain them as actively used facilities on the installation.
- . Eliminate damage or destruction due to improper maintenance, repair, or use that may alter or destroy the significant elements of any property.
- . Enhance the most historically significant areas of the installation through appropriate landscaping and conservation.

To meet these overall preservation objectives, the general preservation recommendations set forth below have been developed:

Category I Historic Properties

All Category I historic properties not currently listed on or nominated to the National Register of Historic Places are assumed to be eligible for

nomination regardless of age. The following general preservation recommendations apply to these properties:

- a) Each Category I historic property should be treated as if it were on the National Register, whether listed or not. Properties not currently listed should be nominated. Category I historic properties should not be altered or demolished. All work on such properties shall be performed in accordance with Sections 106 and 110(f) of the National Historic Preservation Act as amended in 1980, and the regulations of the Advisory Council for Historic Preservation (ACHP) as outlined in the "Protection of Historic and Cultural Properties" (36 CFR 800).
- b) An individual preservation plan should be developed and put into effect for each Category I historic property. This plan should delineate the appropriate restoration or preservation program to be carried out for the property. It should include a maintenance and repair schedule and estimated initial and annual costs. The preservation plan should be approved by the State Historic Preservation Officer and the Advisory Council in accordance with the above-referenced ACHP regulation. Until the historic preservation plan is put into effect, Category I historic properties should be maintained in accordance with the recommended approaches of the Secretary of Interior's Standards for Rehabilitation and

Revised Guidelines for Rehabilitating Historic Buildings² and
in consultation with the State Historic Preservation Officer.

- c) Each Category I historic property should be documented in accordance with Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) Documentation Level II, and the documentation submitted for inclusion in the HABS/HAER collections in the Library of Congress.³ When no adequate architectural drawings exist for a Category I historic property, it should be documented in accordance with Documentation Level I of these standards. In cases where standard measured drawings are unable to record significant features of a property or technological process, interpretive drawings also should be prepared.

Category II Historic Properties

All Category II historic properties not currently listed on or nominated to the National Register of Historic Places are assumed to be eligible for nomination regardless of age. The following general preservation recommendations apply to these properties:

- a) Each Category II historic property should be treated as if it were on the National Register, whether listed or not. Properties not currently listed should be nominated. Category II historic properties should not be altered or demolished. All work on such properties shall be performed

in accordance with Sections 106 and 110(f) of the National Historic Preservation Act as amended in 1980, and the regulations of the Advisory Council for Historic Preservation (ACHP) as outlined in the "Protection of Historic and Cultural Properties" (36 CFR 800).

- b) An individual preservation plan should be developed and put into effect for each Category II historic property. This plan should delineate the appropriate preservation or rehabilitation program to be carried out for the property or for those parts of the property which contribute to its historical, architectural, or technological importance. It should include a maintenance and repair schedule and estimated initial and annual costs. The preservation plan should be approved by the State Historic Preservation Officer and the Advisory Council in accordance with the above-referenced ACHP regulations. Until the historic preservation plan is put into effect, Category II historic properties should be maintained in accordance with the recommended approaches in the Secretary of the Interior's Standards for Rehabilitation and Revised Guidelines for Rehabilitating Historic Buildings⁴ and in consultation with the State Historic Preservation Officer.
- c) Each Category II historic property should be documented in accordance with Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) Documentation Level

II, and the documentation submitted for inclusion in the HABS/HAER collections in the Library of Congress.⁵

Category III Historic Properties

The following preservation recommendations apply to Category III historic properties:

- a) Category III historic properties listed on or eligible for nomination to the National Register as part of a district or thematic group should be treated in accordance with Sections 106 and 110(f) of the National Historic Preservation Act as amended in 1980, and the regulations of the Advisory Council for Historic Preservation as outlined in the "Protection of Historic and Cultural Properties" (36 CFR 800). Such properties should not be demolished and their facades, or those parts of the property that contribute to the historical landscape, should be protected from major modifications. Preservation plans should be developed for groupings of Category III historic properties within a district or thematic group. The scope of these plans should be limited to those parts of each property that contribute to the district or group's importance. Until such plans are put into effect, these properties should be maintained in accordance with the recommended approaches in the Secretary of the Interior's Standards for Rehabilitation and Revised

Guidelines for Rehabilitating Historic Buildings⁶ and in consultation with the State Historic Preservation Officer.

- b) Category III historic properties not listed on or eligible for nomination to the National Register as part of a district or thematic group should receive routine maintenance. Such properties should not be demolished, and their facades, or those parts of the property that contribute to the historical landscape, should be protected from modification. If the properties are unoccupied, they should, as a minimum, be maintained in stable condition and prevented from deteriorating.

HABS/HAER Documentation Level IV has been completed for all Category III historic properties, and no additional documentation is required as long as they are not endangered. Category III historic properties that are endangered for operational or other reasons should be documented in accordance with HABS/HAER Documentation Level III, and submitted for inclusion in the HABS/HAER collections in the Library of Congress.⁷ Similar structures need only be documented once.

CATEGORY I HISTORIC PROPERTIES

There are no Category I historic properties at the SLAAP.

CATEGORY II HISTORIC PROPERTIES

There are no Category II historic properties at the SLAAP.

CATEGORY III HISTORIC PROPERTIES

Billet-Cutting Building (Building 1)

Forge Shop (Building 2)

Machining Building (Building 3)

- Background and Significance. The Billet-Cutting Building (Building 1), Forge Shop (Building 2), and Machining Building (Building 3) (Figures 3, 4, 5) are the main production facilities in the SLAAP's 105-mm projectile-manufacturing complex. Placed on line in late 1944, they originally comprised only a small part of the SLAAP's total manufacturing operation, but with the dismantling and sale of the rest of the installation in the mid-1960s, they now constitute the plant's only production capability. Currently in standby condition, the three buildings house production equipment for manufacturing steel billets into finished 105-mm shell bodies. Experiencing only minor modification during the Korean and Vietnam Wars, the production lines substantially preserve their original World-War-II technology. As good examples of a highly intact industrial process, the Billet-Cutting Building (Building 1), Forge Shop (Building 2), and Machining Building (Building 3) are Category III historic properties.

- . Condition and Potential Adverse Impacts. The buildings are currently "laid way" facilities. They receive routine maintenance and are in good condition. There are no current plans to alter or demolish the structures.
- . Preservation Options. Refer to general preservation recommendations at the beginning of this chapter for Category III historic properties.

NOTES

1. Army Regulation 420-40, Historic Preservation (Headquarters, U.S. Army: Washington, D.C., 15 April 1984).
2. National Park Service, Secretary of Interior's Standards for Rehabilitation and Revised Guidelines for Rehabilitating Historic Buildings, 1983 (Washington, D.C.: Preservation Assistance Division, National Park Service, 1983).
3. National Park Service, "Archeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines," Federal Register, Part IV, 28 September 1983, pp. 44730-44734.
4. National Park Service, Secretary of the Interior's Standards.
5. National Park Service, "Archeology and Historic Preservation."
6. National Park Service, Secretary of the Interior's Standards.
7. National Park Service, "Archeology and Historic Preservation."

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